REMARKS

The Examiner indicated that claims 1-9 were pending at the issuance of the instant Office Action. Claims 1-9 have been canceled, and new claims 10-21 have been added. The new claims are fully supported by the specification. No new matter has been added as a result of the above-described amendments. The rejections set forth in the Office Action have been overcome by amendment or are traversed by argument below.

1. Information Disclosure Statement

In the Information Disclosure Statement filed 15 April 2004, Japanese foreign document JP2002-508837 was listed alongside PCT published document WO9853304. JP2002-508837 is the same as WO9853304. Therefore, an English translation of JP2002-508837 has already been submitted and considered. A copy of the English abstract is enclosed herewith.

A Supplemental Information Disclosure Statement has also now been submitted listing further Japanese documents cited in the application but not previously listed in an Information Disclosure Statement, together with Abstracts in English of those documents.

2. Objection to the Specification

The title of the invention has been amended to "A bio-microarray and a substrate for use therewith".

3. Objection to claim 2

Claim 2 is cancelled.

4. Rejection of claims 2-8 under 35 U.S.C. § 112, second paragraph

The Examiner has rejected claims 2-8 under 35 U.S.C. § 112, second paragraph. These claims are now cancelled, rendering the Examiner's rejections moot.

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The Examiner had rejected those claims for recitation of the terms substrate for being vague and indefinite. Applicant respectfully submits the following remarks with respect to new independent claims 10 and 12, and the term substrate and embodiments thereof. are definite under 35 U.S.C. § 112, second paragraph.

The Examiner also rejected the term fine under 35 U.S.C. § 112, second paragraph. New claims 10 and 12 define a fine particle as having a particle diameter in a range of 50 nm to 300nm. This limitation is supported in the originally filed application at page 14, lines 24-26. Therefore the term fine as applied in claim 10 is definite under 35 U.S.C. § 112, second paragraph.

The Examiner also rejected the terms "uneven structure" and "porous structure" under 35 U.S.C. § 112, second paragraph, asking how the substrate is uneven or porous, how the term "fine" limits such structures, and how the type of embodiments claimed would be known. In new claims 10 and 12, the term "fine particle" is defined as having a particle diameter in a range of 50 nm to 300 nm. Applicant asserts therefore that it would be clearly understood that the term fine refers to a particle diameter in a range of 50 nm to 300 nm as applied to the substrate, whether it was a particle of a "fine uneven structure" or of a "fine porous structure".

Regarding the term "uneven structure" recited in new independent claim 10, and the term "porous structure" recited in new independent claim 12, Applicant respectfully asserts that the terms "fine" and "uneven" and "porous" as applied to the surface of the substrate would be clear to those skilled in the art. Detailed descriptions are provided in the specification, such as the preferable range of diameter of particle, the preferable producing methods and the like, that would enable one skilled in the art to understand what type of embodiment are claimed in the recitation of a fine uneven structure on the surface of the substrate or a fine porous structure on the surface of the substrate (see page 13, line 19-page 14, line 13, page 14, line 19-page 15, line 3, page 16, lines 18-19, page 17, line 13-page 18, line 1). Figures 2 and 3 illustrate, respectively, a fine uneven structure and fine porous structure on the surface of the substrate, each comprising anti-reflection layer (2) having the fine uneven or porous structure (1) on the

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surface of the substrate (see page 16, lines 17-19).

Applicant respectfully asserts that although the term "fine porous structure" of new claim 12 is not limited to the embodiment of the specification, based on the specification as filed, one ordinary sill in the art would be able to understand what the term "fine porous structure" indicates.

Accordingly, Applicant respectfully that new independent claims 10 and 12 are definite under 35 U.S.C. § 112, second paragraph. Claims 11, and 13-21 all depend from independent claims 10 and 12 and are therefore indefinite under 35 U.S.C. § 112, second paragraph.

Applicant therefore requests that the Examiner grant that claims 10-21 are allowable under this statute.

5. Rejection of the claims under 35 U.S.C. § 102(b)

The Examiner has rejected pending claim 1 as being anticipated by Hattori (Advanced Materials, 2001). Previously pending claims 1-9 were also rejected as being anticipated by Borgart et al. (US 5,468,606) and as being anticipated by Pirrung et al. (US 5,143,854). Claims 1-9 are cancelled, thereby obviating these rejections.

With regard to Hattori, Applicant wishes to draw the Examiner's attention to copending application USSN 10/ 018718 having a filing date of December 14, 2001. Applicant also respectfully contends the following with regard to the presently added new claims.

With regard to new claims 10, 13, 16 and 19, Bogart discloses an optical substrate on which an optical diffusing layer comprising a polystyrene spheres with a diameter of 2 microns is formed. The fine particle used in new claim 10 has a particle diameter in a range of 50nm to 300nm which is significantly smaller than that of the fine particle used in Bogart. Accordingly, claim 10 is not anticipated by Bogart. Since claims 13, 16 and 19 are dependent on new claim 10, Bogart cannot be said to anticipate claims 10, 13, 16 and 19.

The substrate for bio-microarray of new claim 10 has an anti-reflection layer

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comprising a fine uneven structure, thereby the substrate has effects of not only having the reflection-suppressing function but also of improving the detection accuracy by substantially increasing a surface area of a substrate surface immobilizing the probe biomolecule. Further, since the fine uneven structure is formed by the anti-reflection layer comprises a fine particle with a significantly small particle diameter of 50nm to 300nm, the reflection-suppressing function and the detection accuracy are able to exist at the same time to make the substrate of the present invention suitable for bio-microarray application. Bogart, on the other hand, discloses merely that the diffusing properties are given to the substrate by forming an optical diffusing layer comprising a fine particle. Bogart therefore cannot either be said to make obvious that the instant substrate can obtain a reflection-suppressing function suitable for bio-microarray application and can improve the detection accuracy by modifying the particle diameter of the fine particle.

With regard to new claims 11, 14, 17 and 20, Bogart discloses an optical substrate with an anti-reflection layer formed thereon, but does not disclose an anti-reflection layer having a fine uneven structure of an embodiment where the fine particle is not included. Therefore, new claim 11 is not anticipated by Bogart. Since new claims 14, 17 and 20 are dependent on new claim 11, new claims 14, 17 and 20 are not made obvious by Bogart.

The anti-reflection layer used in new 11 has a fine uneven structure with a depth in a range from 80nm to 250nm. Since the anti-reflection layer has such a fine uneven structure, a surface area of a substrate surface immobilizing the probe biomolecule increases substantially and improves the detection accuracy. In this respect, Bogart does not disclose any description at all relating to the anti-reflection layer with a fine uneven structure. Thus, it would not be obvious for one skilled in the art that the substrate for bio-microarray with the above-mentioned advantage can be obtained by the anti-reflection layer having an uneven structure with a specific range of depth. Accordingly, new claims 14, 17 and 20 which are dependent on new claim 11 are, equally, not made obvious by Bogart.

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With regard to new claims 12, 15, 18 and 21, Bogard discloses an optical substrate with an anti-reflection layer formed thereon, but does not disclose an anti-reflection layer having a fine porous structure. Therefore, the new claim 12 is not anticipated by Bogart. Equally, since new claims 15, 18 and 21 are dependent on new claim 12, they are not anticipated by Bogart.

The anti-reflection layer used in new claim 12 has a fine porous structure. Since the anti-reflection layer has such a fine porous structure, the surface area of a substrate surface immobilizing the probe biomolecule increases substantially and improves the detection accuracy. Bogart does not disclose or suggest any description at all relating to the anti-reflection layer with a fine porous structure. Thus, it would not be obvious for one skilled in the art that the substrate for bio-microarray with the above-mentioned advantage can be obtained by the anti-reflection layer having a fine porous structure. Accordingly, new claim 12 would not be made obvious by Bogart. Since new claims 15, 18 and 21 are dependent on new claim 12, new claims 15, 18 and 21 are equally not made obvious by Bogart.

With regard to new claims 10, 12, 13, 15, 16, 18, 19 and 21, Pirrung does not disclose a substrate having an anti-reflection layer comprising a fine particle and a substrate with an anti-reflection layer comprising a fine porous structure formed. Accordingly, new claims 10 and 12 are not anticipated by Pirrung. Equally, since claims 13, 16 and 19 are dependent upon new claim 10, and since new claims 15, 18 and 21 are dependent on new claim 12, none of these claims is anticipated by Pirrung.

Furthermore, since Pirrung does not disclose a substrate having an anti-reflection layer comprising a fine particle and a substrate with an anti-reflection layer comprising a fine porous structure formed, it would not be obvious to one skilled in the art to obtain the substrate for bio-microarray with the reflection-suppressing function and high detection accuracy on the substrate, by forming an anti-reflection layer comprising a fine particle of a predetermined particle diameter to form a fine uneven structure and an anti-reflection layer having a fine porous structure. Accordingly, new claims 10 and 12 would not be obvious under Pirrung. Similarly, since new claims 13,

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16 and 19 are dependent on new claim 10, and new claims 15, 18 and 21 are dependent on new claim 12, none of these claims would be made obvious by Pirrung.

With regard to new claims 11, 14, 17 and 20, Pirrung discloses a substrate having a material of a light-absorbing characteristic or an optically transparent characteristic on a surface thereof, where in the substrate has raised or depressed regions. The Examiner argues that the material of a light-absorbing characteristic or an optically transparent characteristic on the substrate surface is equivalent to the "anti-reflection layer" of the present invention, and that the raised or depressed regions are equivalent to the "fine uneven structure" of the present invention. However, according to new claim 11, it is the anti-reflection layer formed on the substrate to have the fine uneven structure. Thus, claim 11 is distinguished from the substrate of Pirrung which has raised or depressed regions. Moreover, Pirrung does not disclose any descriptions on specific size of the raised or depressed regions. By contrast, the new claim 11 has an anti-reflection layer comprises a fine uneven structure having a depth in a range from 80nm to 250nm and is therefore distinguished from the substrate disclosed in the Pirrung.

Accordingly, new claim 11 is not anticipated by Pirrung. Equally, new claims 14, 17 and 20 which are dependent on new claim 11 are not anticipated by Pirrung.

Moreover, Pirrung provides no description or suggestion of specific size of the raised or depressed regions. Therefore it would not be obvious from Pirrung to provide a substrate for bio-microarray with a reflection-suppressing function and high detection accuracy, by having the anti-reflection layer with a fine uneven structure of a depth in a range from 80nm to 250nm. Accordingly, new claim 11 would not be made obvious by Pirrung. New claims 14, 17 and 20 which are dependent on new claim 11 would equally not be made obvious by Pirrung.

Applicants respectfully contend that the rejections have been mooted by cancellation of the rejected claims, and request that the Examiner withdraw all rejections made on this basis. Applicants respectfully request that the Examiner pass these claims to issue in view of the above remarks.

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6. Rejection of claims 1-9 on obviousness-type double patenting grounds

The Office Action asserts a rejection of claims 1-21 under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1, 3-6, 12, 14, 16, 18 and 20 of co-pending U.S. Patent Application No. 10/018,718. Applicants note that in accordance with MPEP 804.1B, a provisional double patenting rejection is only a warning and although *"the merits of [a] provisional [double patenting] rejection can be addressed by both the applicant and the examiner without waiting for the first patent to issue"* addressing such issue at this stage is not required. Therefore Applicants respectfully request the Examiner to postpone such provisional rejection and convert such provisional rejection into a non-provisional one in one of the two applications as soon as the other goes to grant.

Withdrawal of this rejection is therefore respectfully solicited.

CONCLUSIONS

Applicants respectfully contend that all conditions of patentability are met in the pending claims as amended. Allowance of the claims is thereby respectfully solicited.

If Examiner Lum believes it to be helpful, he is invited to contact the undersigned representative by telephone at (312) 408-2535.

Respectfully submitted,
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Dated: November 17, 2005

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Re: Cu-3633 USSN. 10/798,001 Response Nov 17, 2005

Optical substrate for enhanced detectability of fluorescence

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Applicant:
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Abstract not available for JP2002508837T
Abstract of corresponding document: **US6008892**

A sample substrate for use in a fluorescence imaging system includes a rigid base with a specularly reflective surface, typically metal, on which is deposited a transparent coating layer. The coating layer has a thickness selected so that a particular fluorescence excitation wavelength, corresponding to a specified fluorescent constituent to be sought in sample material, has an optical path from the top of the coating layer to the reflecting surface in the base of substantially an odd multiple of one-quarter wavelength, so that the standing wave of the fluorescence excitation wavelength of light incident on the substrate has an antinode located at or near where sample material would be disposed on top of the coating layer. This maximizes fluorescence excitation of the sample on the reflective substrate. The transparent coating layer may be a dielectric material (e.g. silica) or may be a multilayer structure with a top layer of biologically active material for binding a specified sample constituent.